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ODONATA (DRAGONFLIES) FROM THE INDIAN OCEAN, AND FROM
KASHMIR, COLLECTED BY DR. W. L. ABBOTT.¹

BY PHILIP P. CALVERT, PH. D.

Dr. W. L. Abbott, of Philadelphia, made collections of Odonata in the Aldabra (Lat. 9° 25' S., Long. 46° E.), and the Glorioso (Lat. 11° 40' S., Long. 47° 33' E.), and the Seychelle Islands in the Indian Ocean, and in Kashmir, which he sent to the U. S. National Museum. These, by the direction of the late Dr. C. V. Riley, were sent to me for study. Their consideration is here grouped under two heads.

I. FROM THE INDIAN OCEAN.

A number of papers treating of the Odonata of some of these islands lying near Madagascar already exist. As far as they are known to me they are given below, in chronological order.²

¹ Based on collections of the U. S. National Museum, Washington, D. C. Researches made in the laboratories of the Academy of Natural Sciences of Philadelphia, and of the University of Pennsylvania, Philadelphia.

² de Selys-Longchamps, E. Névroptères. Annexe K. pp. 32-35, in Notes sur l'Ile de la Reunion par L. Maillard. Seconde Partie. Paris, Dentu, Editeur, 1862. 6 spp. Reunion (Bourbon). 19 spp. Mauritius (Ile-de-France).

Brauer, F. Neue exotische Odonaten. Verh. k. k. Zool.-bot. Gesell. Wien., xvii, pp. 811-816, 1867. 1 n. sp. Mauritius. See on this Karsch. Ent. Nach., xx, p. 382, 1894.

Wright, E. P. Notes on the Dragonflies of the Seychelles. Ann. Mag. Nat. Hist. (4), iii, pp. 270-272. April, 1869.

de Selys-Longchamps, E. List of Species and Description of a new Genus and five new species of Dragonflies (Odonata) from the Seychelles. Ann. Mag. Nat. Hist. (4) iii, pp. 272-277. April, 1869. 9 spp.

de Selys-Longchamps, E. Odonates des îles Seychelles. Ann. Soc. Ent. Belg., xii, p. 95-99. Read March 6, 1869 (see Z. c., p. lii). Essentially the same as the preceding.

de Selys-Longchamps, E. Enumeration des Odonates de Madagascar et des Îles Comores et Mascareignes. in Recherches sur la Faune de Madagascar et de ses Dépendances d'après les découvertes de François P. L. Pollen et D. C. Van Dam., 5 me Partie. 1 re livraison. Leyde, J. K. Steenhoff, editeur., 1869. 31 (?) spp. Madagascar, 7 spp. Nossi-Bé, 3 spp. Comoro Is., 21 (?) spp. Mauritius, 9 spp. Bourbon, 1 sp. Rodriguez.

de Selys-Longchamps, E. Note sur plusieurs Odonates de Madagascar et des îles Mascareignes. Revue et Mag. Zool. (2) xxiii, pp. 175-183. April, 1872. Supplementary to the preceding; suppresses 1 sp. Madagascar, 1 sp. Mauritius as synonym.

McLachlan, R. A new dragonfly of the genus *Anax* from Madagascar. Ent. Mo. Mag., xxi, pp. 250-251, 1885. 1 n. sp.

No previously published records for the Odonata of the Aldabra and Glorioso Islands appear to exist. Brief accounts of their recent visits to the former are given by Mr. T. Risely Griffith and Dr. Abbott in the Bulletin of Miscellaneous Information, Royal Gardens, Kew, 1893, p. 152 et seq., but these contain nothing as regards insects. A list of the plants collected by Dr. Abbott in the Aldabras is given in the same Bulletin, 1894, pp. 146-150. Dr. Abbott's own "Notes on the Natural History of Aldabra, Assumption and Glorioso Islands, Indian Ocean," in Proceedings U. S. National Museum, XVI, pp. 759-764, 1894, mention the *Pantala flavescens* referred to in this paper.³

In the present paper seven species are mentioned. Five, from the Seychelles, were already known to exist there, but some additional details on their structure or relationships are given. Two species are from the Glorioso Islands, one from Aldabra.

Subfamily AGRIONINÆ.

1. *Leptocnemis bilineata* Selys.

Hemicnemis bilineata Selys Ann. Soc. Ent. Belg., xii, p. 28, 1869. Martin, Mem. Soc. Zool. France, 1896, p. 108.

Two males, Mahé Is., Seychelles.

Kirby, W. F. A Revision of the Subfamily Libellulinae, etc. Trans. Zool. Soc. Lond., xii, pp. 249-348. Pls. li-lvii, 1889. 1 n. sp., Madagascar, p. 317.

Karsch, F. Beschreibung einer neuen Libelluline Madagaskar's. Ent. Nach., xv, pp. 276-277, 1889. Berl. Ent. Zeit., xxxiii, p. 352, 1890. A synonym.

Karsch, F. Beitrag zur Kenntniss der Libellulinen mit vierseitiger cellula cardinalis (*Nannophya* Rambur). Ent. Nach., xv, pp. 245-263, 1889. 1 n. sp. Madagascar, p. 252.

Karsch, F. Ueber Gomphiden. Ent. Nach., xvi, pp. 370-382, 1890. Adds 1 n. sp. of Gomphinae for Madagascar.

de Selys-Longchamps, E. Causeries Odonatologiques no. 6. Les Gomphines d'Afrique. Ann. Soc. Ent. Belg., xxxvi, pp. 86-107, 1892. Adds 2 n. spp. Madagascar, 2 n. spp. Nossi-Bé.

Calvert, P. P. Preliminary notes on some African Odonata. Trans. Am. Ent. Soc., xix, pp. 161-164, 1892. Notes on 2 spp. Seychelles.

de Selys Longchamps, E. Causeries Odonatologiques no. 7. Ann. Soc. Ent. Belg., xxxviii, pp. 163-181, 1894. Adds 1 n. sp. Gomphinae Madagascar.

Calvert, P. P. East African Odonata. collected by Dr. W. L. Abbott. Proc. U. S. Nat. Mus. xviii, pp. 121-142, 1895 [1896]. Notes on 4 spp. Seychelles. See also Calvert, P. P. Ent. Nach., xxii, p. 215, 1896.

Martin, R. Odonates des Iles Seychelles. Mem. Soc. Zool. France, 1896, pp. 101-112. 20 spp., 5 new. Adds also 3 spp. for Madagascar.

³ Since the above was written, Dr. A. Voeltzkow has given an account of his recent visit to Aldabra, with references to the literature of previous visits by other travellers, in Abhandlungen von der Senckenbergischen Naturforschenden Gesellschaft, xxi, 1. Frankfurt, 1897.

Subfamily LIBELLULINÆ.

2. *Pantala flavescens* Fabricius.

Four males Glorioso Is., one of them dated Jan. 28, 1893. Four males, eight females, Aldabra Is.

3. *Tramea basilaris* Beauvois.

Libellula basilaris Beauvois Ins. rec. Afrique et Amer. p. 171, pl. ii, f. 1, 1805
Synonym? *Tramea Burmeisteri* Kirby, Trans. Zool. Soc. London, xii, p. 316, 1889.

One male, four females, Glorioso Is., the male and one female dated Jan. 29, 1893.

Mr. Kirby states (*l. c.*) that his *Burmeisteri* is "nearly allied to the African *T. basilaris* Beauv., in which, however (judging from the single broken specimen before me), the yellow area on the hind wings is much less extended, and the opaque spaces (of which the upper one is much more extended) is nearly black."

In all these Glorioso individuals, the yellow area on the hind wings extends from the base outward as far as the external angle of the triangle; in the male it reaches backward (caudad) to the anal 'angle,' in the females back to three-fourths of the width of the wing-base; as regards the extent of the yellow area, therefore, these individuals have, in Mr. Kirby's view, a character of *Burmeisteri* rather than of *basilaris*.

On the other hand, the upper basal band of the hind wings of *Burmeisteri* fills up "more or less of the lower basal cell and part of the wing *below* [the italics are mine] adjacent as far as the base of the triangle" (Kirby, *l. c.*). In these Glorioso females, but not in the male, the blackish-brown fills up the basilar [median of Selys, 1896] space (=upper basal cell of Kirby), the subcostal space to the first (1 ♀) or second (3 ♀) antecubital, and parts of the supra-triangular space and of the triangle as well as the "lower basal cell and part of the wing below adjacent"; this distribution of the dark color is a character of *basilaris*. In the Glorioso male the brown on the hind wings is reddish-brown and therefore paler than in the females; it fills the "lower basal cell and part of the wing below adjacent" and extends into the triangle, and is separated from a second, wider reddish-brown band extending from the inner margin to the distal subbasal sector although not actually touching either margin or sector; this second band therefore does not "run from the base of the sector of the triangle" as in *Burmeisteri*.

I have before me also two males from Madagascar, similar to the one described above, sent to me by M. Martin as *basilaris*.

Altogether I think that the probability is that *basilaris* and *Burmeisteri* are color extremes of one and the same species.

It may be recorded here that in these Glorioso individuals the first pair of legs are blackish like the others, that the genital hamule of the male projects beyond the genital lobe, that the inferior appendage of the male is half as long as the superiors and reaches to the last denticle thereof, the superiors being longer than 9+10 but shorter than 8+9+10, and that the vulvar lamina of the female is three-fourths as long as 9, bilobed in its own apical three-fourths, and her appendages as long as 9+10.

This species has not been recorded from the Seychelles.

4. *Tramea continentalis* Selys.

Selys, Mitth. Dresdner Mus., iii, p. 299, 1878. Martin, Mem. Soc. Zool. France, 1896, p. 102.

One male, one female, Mahé Is., Seychelles.

The male is the same form so identified by M. Martin as he has sent me one of his Seychelle specimens. The female is like those he mentions in his last sentence (*l. c.*) "Certaines femelles n'ont meme qu'une petite tache marron très courte, le long de la membrane et le surplus de la tache normale est indiqué par une teinte jaune brulé très clair, presque limpide." A male in my collection from West Madagascar by Hildebrandt, formerly in the Museum für Naturkunde, Berlin, where it stood as *T. limbata* is of the same species and Mr. Kirby's description of *Tramea madagascarensis* (Trans. Zool. Soc., London, XII, p. 317, 1889) also applies here. Unfortunately even M. Martin does not give a sufficiently full statement of the distinctions between *limbata* Desjardins and *continentalis* Selys, and it is not certain that the insect I have described as *T. limbata* (Proc. U. S. Nat. Mus. xviii, p. 121; Ent. Nachr. xxii, p. 217, 1896) really is such.

In these two *continentalis*—the male has the hamule projecting considerably beyond the genital lobe, the superior appendages are almost as long as 8+9+10, the inferior appendage is almost half as long as the superiors and reaches slightly beyond their denticles; the female has the vulvar lamina seven-eighths as long as 9, bilobed in its apical three-fourths, the appendages as long as 9+10.

5. *Orthetrum wrightii* Selys.

Libellula wrightii Selys, Ann. Soc. Ent. Belg, xii, p. 96, 1869; Ann. Mag. Nat. Hist. (4), iii, p. 272, 1869. *O. W.* Calvert, Trans. Amer. Ent. Soc., xix, p. 163, 1892; Proc. U. S. Nat. Mus., xviii, p. 134, fig. 12, 1896. Martin, Mem. Zool. Soc., France, 1896, p. 102.

Ten males, two females, Mahé Is., Seychelles.

The pale spot on the upper surface of the frons, enclosed by blue-black, is yellow in some individuals instead of olive. The front wings with 12-14 antenodals, 9-10 postnodals, the internal triangle 4-celled in one male only. Inner side of the triangle of the hind wings in the prolongation of the arculus in all.

Having recently studied the type of *O. stemmale* Burm. from Mauritius, now in the Museum of Comparative Zoology at Cambridge, Massachusetts, I have reached the conclusion that *wrightii* is but a race thereof, as the only differences I can find are the following:

	<i>stemmale</i> , ♂	<i>wrightii</i> , ♂ ♀
Rhinarium	darker than nasus	concolorous with nasus.
Black at the middle of the base of the labrum reaching	half-way to the free margin	to the free margin (except in one young ♂ where it reaches hardly half-way.)
Superior surfaces of second and and third femora and of first and second tibiæ	luteous	black (or reddish-brown in some immature males.)
Inferior appendage of the male compared to the superiors	one-fifth shorter	one-fourth to one-third shorter.
Total length	50 mm.	46-39 ♂, 44-41 ♀
Abdomen (length)	34 mm.	31.5-27 ♂, 31-28.5 ♀
Front wing (length)	36.5 mm.	34-29 ♂ ♀
Hind wing (length)	34.5 mm.	32-28 ♂ ♀
Pterostigma		
front wing	3.6 mm.	} 3.4-3. ♂ ♀
hind wing	4. mm.	

The data here given for *Wrightii* are based on the twelve individuals above cited and on eight males and three females sent me by M. Martin.

Among Dr. Abbott's specimens of this species are one male and one female, not in the least pruinose on thorax and base of abdomen, which have the frons and the labrum luteous without black except at the base of the frons.

6. *Schizonyx luctifera* Selys.

Zygonyx ? luctifera Selys, Ann. Soc. Ent. Belg., xii, p. 96, 1869. Martin, Mem. Soc. Zool. France, 1896, p. 103. S. I. Calvert, Trans. Am. Ent. Soc. xix, p. 163, 1892; Proc. U. S. Nat. Mus., xviii, p. 122, fig. 3. 1896 (Additional bibliography in this last).

Two males, Mahé Is., Seychelles. The internal triangle of the front wings is of three cells.

7. *Diplacodes trivialis* Rambur.

Libellula trivialis Ramb. Ins. Névr., p. 115, 1842.

Trithemis t. Martin, Mem. Soc. Zool., France, 1896, p. 102.

One male, two females, Mahé Is., Seychelles.

This species has been referred to *Trithemis* by recent authors, but is surely a *Diplacodes*.

II. FROM KASHMIR.

There does not appear to be anything in print treating especially of the Odonata of Kashmir, although a number of species from this and neighboring regions have been described, chiefly by Baron de Selys, in systematic papers. The following faunal articles are useful for comparison⁴.

The collection made by Dr. Abbott comprises 82 specimens of fifteen species. These are merely labelled "Kashmir" with the

⁴McLachlan, R. Scientific results of the Second Yarkand Expedition, etc. Calcutta, 1878.

Brauer, F. Verzeichniss der von Fedtschenko in Turkestan gesammelten Odonaten. Verhdl. K. K. Zool. bot. Gesell. Wien, xxx, pp. 229-232, 1880.

Kirby, W. F. On a small collection of Dragonflies from Murree and Campbellpore (N. W. India), etc. Proc. Zool. Soc. Lond., 1886, pp. 325-329.

de Selys-Longchamps, E. Odonates de l'Asie Mineure et Revision de ceux des autres parties de la Faune dite Européenne. Ann. Soc. Ent. Belg. xxxi, pp. 2-85, 1887.

de Selys-Longchamps, E. Insecta in itinere Cl. N. Przewalskii in Asia Centrali novissime lecta, XI. Horæ Soc. Ent. Ross., xxi, pp. 441-447, 1887.

McLachlan, R. On two small collections of Neuroptera from Ta-chien-lu, in the Province of Szechuen, Western China, on the frontier of Thibet. Ann. Mag. Nat. Hist. (6), xii, pp. 421-436, 1894.

McLachlan, R. On Odonata from the Province of Szechuen in Western China, and from Moupin, in Eastern Thibet. Ann. Mag. Nat. Hist. (6), xvii, pp. 364-374, 1896.

elevation above or below which they were collected. The U. S. National Museum does not possess any more precise data, which is the more unfortunate as such exist for the mammals and birds collected in this region by Dr. Abbott, and may be found in the papers by Messrs. True and Richmond respectively, in the Proceedings of the U. S. National Museum, volumes XVII and XVIII.

Of the fifteen species ten are well-known as occurring in Europe and a large part of Northern and western Asia, three (*Ischnura inarmata* n. sp., *Orthetrum hyalinum*, *O. triangulare*) are Indian in their relationships, one is the cosmopolitan *Pantala flavescens* and one (*Ophiogomphus reductus* n. sp.) is allied to Palearctic species of a Holarctic genus.

Subfamily AGRIONINÆ.

1. *Lestes barbarus* Fabr.

One female "below 5,000 f." It differs from European examples only by its slightly shorter pterostigma.

This species has previously been recorded from Persia and Turkestan.

2. *Ischnura inarmata* n. sp. Figs. 1, 2.

Two males, three females, "below 5,000 f."

Abdomen ♂ 23-22, ♀ 22. Hind wing ♂ 16-15, ♀ 16-18.

Agree in many respects with de Selys' description of *I. delicata*

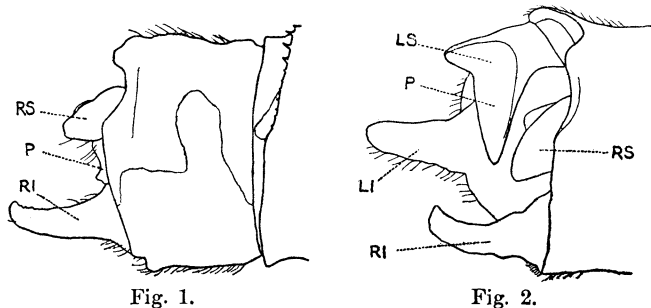


Fig. 1.

Fig. 2.

Fig. 1. Profile view, right side of tenth abdominal segment and the terminal appendages of *Ischnura inarmata* n. sp. ♂. Fig. 2. The same, viewed obliquely from above and behind. RS right superior appendage, LS left superior appendage, RI right inferior appendage, LI left inferior appendage, P inferior process of the superior appendage. The irregular, curved line on the side of the tenth segment in figure 1 indicates the boundary between black above and blue below.⁵ x 20.

⁵ All the drawings which illustrate this paper have been made with the aid of Leitz or Zeiss lenses and the camera lucida.

(=*aurora* Brauer), (Bull. Acad. Roy. Belg. [2] xli, p. 281, 1876) but differ therefrom as follows:

♂.—Pterostigma of the front wings entirely reddish, not whitish at the outer end. Antennæ (except the first joint which is green) black. Pale postocular spots rather large, elongate. No spine near the "échancrure mesothoracique." Sides of the thorax pale green, a very fine black line on the second lateral suture. Abdominal segment 2 with a dorsal black band from base to apex; articulations between 3 and 4, 4 and 5, and 5 and 6 black, 5 with a small dorsal antepical black spot. Dorsum of 6 orange in the basal third to fifth, dark metallic green for the remainder; of 7 entirely dark metallic green; 8 and 9 blue, unspotted, dorsum of 10 black which may be invaded by the blue of the sides at the middle of each side. The appendages blackish; superiors as described for *delicata*, inferiors pale at base, twice as long as the superiors and nearly as long as 10. Figs. 1 and 2.

♀.—Inferior side of the pterostigma as long as the costal side. Head colored as in the above described males. Dorsum of abdominal segments 1–10 dark metallic green, the articulations with narrow, yellow, transverse rings.

Subfamily ÆSCHNINÆ.

3. *Anax parthenope* Selys. Figs. 3 A-E.

Selys, Bull. Acad. Belg., vi (2), p. 389, 1839. Ann. Soc. Ent. Belg., xxvii, p. 116, 1883.

Anax bacchus Hagen, Verhdl. k. k. zool. bot. Gesell. Wien, xvii, p. 48, 1867.



Fig. A.



Fig. B.

One male, three females "below 5,000 f.", one male "5–10,000 f." Abdomen ♂ ♀ 46–49 mm., hind wing ♂ 46–49, ♀ 49–51.

Hagen described *A. bacchus* from a single female in his collection, from the Himalayas, of which he says that it "is throughout so close to *parthenope* in size, form, color and mark-

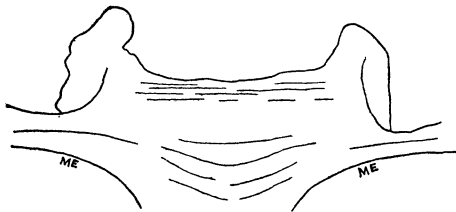


Fig. C.

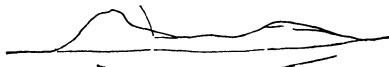


Fig. D.

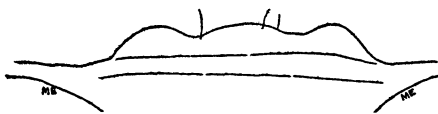


Fig. E.

Fig. 3 A-E x 25.

Hind margin of the occiput of *Anax parthenope*, ♀ showing variations in the two processes or "horns." A. Individual from Kashmir (*bacchus* Hagen), B from Kashmir, C from Indre, France, D from Yokohama showing asymmetry, E from Yokohama. ME hind margins of the eyes.

teeth less developed than in a female of *parthenope* from France, as figs. 3 B and C show.

The close relationship existing between the Odonate fauna of Kashmir and that of Europe, referred to in the introduction of this paper, is clearly seen from the results of a comparison of individuals of this species from France, Kashmir and Japan, as follows :

	2 ♂ 3 ♀ Kashmir	32 ♂ 4 ♀ Yokohoma
	1 ♂ 2 ♀ France	
Humeral and second lateral thoracic sutures	with a narrow black line for their entire length.	with some discontinuous black marks.
Sides of the first abdominal segment inferiorly	with a quadrate dark brown spot reaching from the base to the middle of the segment.	with a small round, blackish dot near the middle of the segment.

ings that I long held it for the same species." He then gives a number of differences which, he believes, distinguish the two forms.

With the more abundant material above cited before me, I find that these differences are not constant, but vary individually. Even what is apparently the most important of these, the possession by *bacchus* of a backwardly-directed, conical tooth on each side of the occiput of the female, is of this varying nature. Of the three females here quoted, one has these

Membranule on uniformly pale white at base, cinereous
all four wings gray. in apical half (front
wings) or three-fourths
(hind wings.)

Hind margin of with two acute, or with two blunt, rounded
the occiput of moderately acute, tubercles (figs. 3 D, E.)
the female processes (figs. 3A-C.)

That is, in the only constant characters which I could find distinguishing the Kashmir from Japanese individuals, the former agreed in all cases with French examples. I have not been able to find any constant characters to separate the French from the Kashmir examples.

Mr. McLachlan (1878) has recorded this species from Srinagar.

Subfamily GOMPHINÆ.

4. *Ophiogomphus reductus* n. sp. Figs. 4, 5, 6 7.

Two males, three females, "5—10,000 f."

Differs from *O. serpentinus* Charp. as follows:

♂ ♀.—No black mark or line on the suture between frons and nasus, or on the nasus; prothorax yellowish green, a transverse band between anterior and middle lobes and either side of the posterior lobe blackish; the two median black bands on the thoracic dorsum wanting; the narrow antehumeral black stripe isolated, touching neither the anterior mesothoracic border below nor the antealar sinus above, or almost entirely wanting in one female; no dark spot behind the posterior legs; the dorsal yellow spot on 3-7 rounded, not pointed, at its hind end, on 8-9 occupying almost the entire length of the segment.

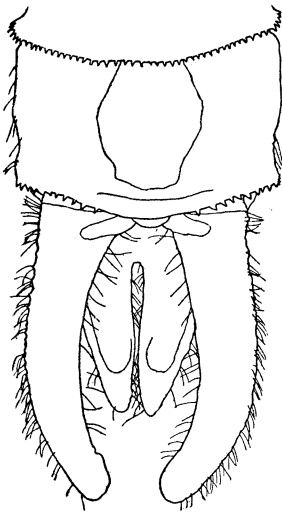


Fig. 4.

Dorsal view of the tenth abdominal segment and the terminal appendages of *Ophiogomphus reductus* n. sp. ♂. x15.

♂.—Superior appendages (2.5 mm.) longer than the 9th (2 mm.), and consequently still longer than the 10th (1.75 mm.) abdominal segment, diverging from each other in their basal half, converging in their apical half in a regular curve, curved also downward in the apical half. Inferior appendage

about one-third shorter; viewed in profile it is directed somewhat upward and the superior margin is biemarginated in two places, viz. immediately behind the base and immediately in front of the apex; both emarginations have curved outlines and the antepical is the smaller of the two; the tip of the appendage is slender and curved upward. The genitalia of the second segment are very similar to those of *serpentinus*, especially as regards the penis, as figured in Monog. Gomph., pl. 5, f. 2.

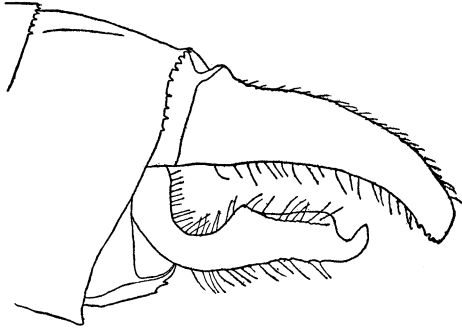


Fig. 5.

Profile view, left side of the terminal abdominal appendages of *Ophiogomphus reductus* n. sp. ♂ x 15.

Anal triangle of the hind wings 4-celled.

♀. The two "horns" of the occiput are much shorter, in one female the right horn is absent and the left is represented merely by two black denticles. Second and third tarsal joints superiorly (externally) more or less yellowish. These females consequently, as far as the coloration of the abdomen and of the tarsi is concerned, resemble the female from southern Russia described on p. 81, Monog. Gomph. Dimensions.—Abdomen ♂ 37.5 mm., ♀ 37–39. Hind wing ♂ 33–34, ♀ 35–37.

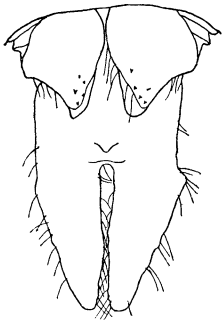


Fig. 6.

Ventral view of the inferior abdominal appendage of *Ophiogomphus reductus* n. sp. ♂ x 15.

From *spiniornis* Selys (Bull. Acad. Roy. Belg.—2—xlvi, p. 437, 1878) described from a single female, from the mountains north of Pekin, these females differ by the absence of a black line on the fronto-nasal suture, the predominant color of the vertex blackish, the "horns" of the occiput bearing denticles as in *serpentinus*, not a single short spine, the absence of the black median dorsal thoracic stripes, the isolated position of the black antehumeral stripe.

From *O. assimilis* Schneider (Selys in Monogr. Gomph., p. 81, 1857), from Asia Minor, known from two males, these males differ

by the entirely yellow lips and nasus, the rear of the head mostly

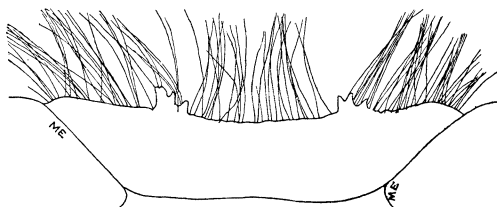


Fig. 7.

Occiput of *Ophiogomphus reductus* n. sp. ♀ to show its two processes ("horns"). ME margins of the eyes. x 25.

yellow as in *serpentinus*, the absence of the median and the isolated position of the antehumeral stripes on the thoracic dorsum; a mere black line only, no band, on the second lateral thoracic suture, no

intermediate band; the dorsal yellow spots on 3-6 longer and rounded at their hind ends.

Subfamily CORDULEGASTERINÆ.

5. *Cordulegaster bidentatus* Selys.

Selys, Ann. Soc. Ent. France (2) i, p. 109, 1843. Ann. Soc. Ent. Belg., xxxi, p. 34, 1887.

One male, "below 5,000 f.", agrees with *bidentatus* in its appendages (very nearly), in the number of cells (three) in the anal triangle, and in those color differences which distinguish *bidentatus* from *insignis*. It differs from *bidentatus* in having an apical inferior yellow spot on abdominal segment 1, and a twin apical yellow spot on the dorsum of 4-6, a yellow spot on each side of the apex of 7-9, and a basal yellow spot on each side of 10; all the yellow spots on the abdomen are larger than in *bidentatus*. Abdomen 55 mm., hind wing 46. The most eastern record for *bidentatus* hitherto appears to be Asia Minor.

Subfamily LIBELLULINÆ.

6. *Pantala flavescens* Fabricius.

Two females, "below 5,000 f."

7. *Libellula quadrimaculata* L.

Four males, four females "below 5,000 f."

Only in three of these, all females, does the black basal spot of the hind wings extend into the triangle, and even in these three it does not completely fill the triangle. These females and one male may be referred to the variety *prenubila*, although the brown cloud below the pterostigma is in no case intense. One of these females is also interesting in that it approaches *basilinea* McLach. (Ann. Mag.

Nat. Hist. [6] xiii, p. 430, 1894), as on the front wings a dark-brown streak occurs in the submedian space from the cross-vein almost to the distal end, and there is a small, separate brown spot in the same space on the basal side of the same cross-vein; in the subcostal space of the same wings there are, between some of the antecubitals, small pale brown spots in the midst of the yellow of the anterior margin. This yellow extends to the pterostigma in all but two males. The ventral abdominal spots of *basilinea* are not present.

Recorded from Turkestan (Brauer), Persia and Yarkand (Selys).

8. *Orthetrum cancellatum* L.

Five males, nine females, "below 5,000 f."

Recorded from the eastern side of the Caspian and from Persia (Selys).

9. *Orthetrum brunneum* Fonsc.

Five males, three females, "below 5000 f."; two females "5-10,000 f." Not distinguishable from European specimens, with which I have carefully compared them, and certainly different from *gracile* (Albarda) Selys and *Ramburii* Selys. One female has the discoidal triangle of both hind wings crossed by one vein, but I can find nothing to indicate that it is of a different species.

Abdomen ♂ 27-28, ♀ 27-28. Hind wing ♂ 34-35, ♀ 34-35.

Recorded from Turkestan (Brauer) and Persia (Selys).

10. *Orthetrum hyalinum* Kirby (?)

O. h. Kirby, Proc. Zool. Soc. Lond., 1886, p. 326, pl. xxxiii, figs. 5, 6.

One female, "below 5,000 f." is probably this species, although it is larger (total length 38 mm., abdomen 25, hind wing 29, alar expanse 62), and the thorax is pale olive instead of reddish-brown, which may not, however, indicate more than that this individual is more immature.

11. *Orthetrum triangulare* Selys.

Libella t. Selys, Mittheil. zool. Mus. Dresden, iii, p. 314, 1878.

Two males, "below 5,000 f." agree with the very brief diagnosis. Their size is rather large; abdomen 31.5, hind wing 38 mm.

12. *Crocothemis erythræa* Brullé.

Six males, five females "5-10,000 f."; six males, five females "below 5,000 f." Abdomen ♂ 21-23.5, ♀ 21-22 mm., hind wing ♂ 25-27.5, ♀ 25-29. In seven males and eight females, and on one side

only of one male and one female, the sectors of the triangle are a little separated at their origin.

Previously known from Turkestan (Selys).

13. *Sympetrum* (or *Diplax*) *vulgatum* L.

One male, "5-10,000 f.", has the black longitudinal line on each side of the third abdominal segment, the basal line of the frons prolonged inferiorly in front of the eyes, hamules as described by Baron de Selys (Ann. Soc. Ent. Belg., xxxi, p. 10). It is of the typical form of *vulgatum* and not of the race *decolorata* Selys.

14. *Sympetrum* (*Diplax*) *Fonscolombii* Selys.

One male, two females "5-10,000 f."; one female "below 5,000 f." In the male, which is semi-adult, the yellow on the base of the hind wings reaches out in the submedian space almost to the triangle and more than half way back toward the hind margin. In the females the extent of this yellow is smaller and like that of European examples.

Previously known from Turkestan, and Murree in N. W. India. Mr. C. C. Adams and Prof. M. J. Elrod have sent me both sexes from the plateau of the Nilgiris, 7,500 ft., taken in August and September, 1896.

15. *Sympetrum* (*Diplax*) *meridionale* Selys.

One female, "below 5,000 f." There is a greater extension of yellowish coloring over the bases of the wings than is usual in European individuals of this species, but the other characters agree. Baron de Selys refers to this species a female from "les montagnes de l'Inde." (Ann. Soc. Ent. Belg., xxviii, p. 36, 1884).